Catalogue of American Amphibians and Reptiles.

LYNCH, JAMES F. 1974. *Aneides flavipunctatus.*

Aneides flavipunctatus (Strauch)
Black salamander

Plethodon flavipunctatus Strauch, 1870:71. Type-locality, "New Albion" (probably eastern Sonoma or western Napa County, California, *fide* Myers and Maslin, 1948). Holotype, Zoological Institute, Academy of Sciences, Leningrad; collected by W. Wosnessensky (type now apparently lost).

Plethodon iëcanus Cope, 1883:24. Type-locality, "Baird, Shasta County, California." Holotype, Acad. Nat. Sci. Phila. 14061 (not examined by author).

Anaides iëcanus: Cope, 1886:526. First use of combination.

Autodax iëcanus: Cope, 1889:187. First use of combination.

Aneides iëcanus: Grinnell and Camp, 1917:135. First use of combination.

Aneides flavipunctatus: Storer, 1925:119. First use of combination.

• CONTENT. Two subspecies are recognized: *flavipunctatus* and *niger.*

• DEFINITION. Adults are of moderate to large size (maximum recorded snout-vent length 93 mm). Average size of reproductively mature individuals ranges from about 60 mm (southern Sonoma County) to about 75 mm (parts of Humboldt, Trinity, and Mendocino counties). The trunk and tail are nearly circular in cross section, except for a slight dorsal flattening. Costal grooves number from 14 to 16. The toes of adpressed limbs fail to overlap by 3 to 5 intercostal folds. In adults the number of maxillary teeth ranges from about 7–15, of which 4–6 are enlarged. Posterior maxillary and dentary teeth are elongate and slightly flattened, but anterior teeth are small and relatively unspecialized. Vomerine teeth are small and few in number (4–11). The vomerine tooth series do not extend to the internal nares.

The species is characterized by strong development of melanic pigmentation, especially on the dorsum. White and/or brassy iridophores are generally scattered upon the black ground color, but their size and abundance are subject to dramatic ontogenetic and geographic variation. In juveniles the dorsal and ventral surfaces are frosted with a net-like suffusion of brassy iridophores. This brassy pigmentation generally disappears as the animals mature, but in the northwestern portion of the range the juvenile pattern persists in slightly modified form throughout adulthood.

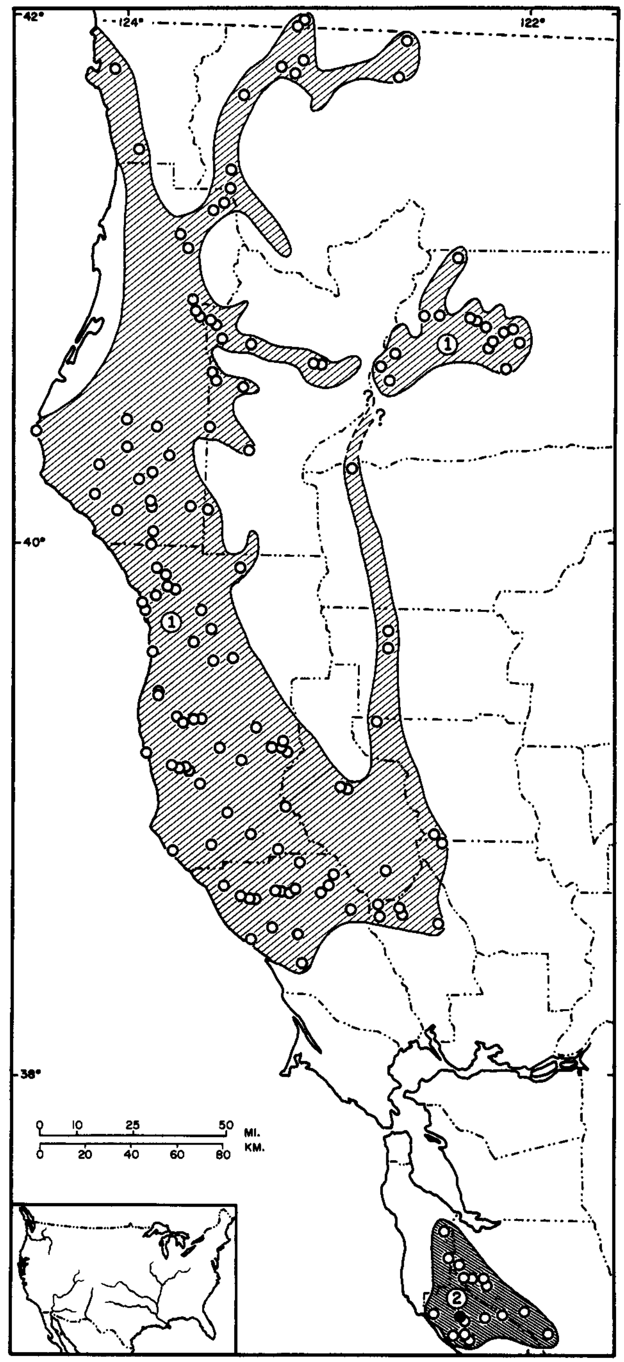
Secondary sexual dimorphism is evident in larger adults. Although there is no consistent difference between the sexes in overall size, males have broader heads and possess conspicuous hedonic and mental glands.

• DESCRIPTIONS. Eggs are described by Van Denburgh (1895), Storer (1925), and Stebbins (1951, 1954). Juveniles are described by Myers (1930) and Stebbins (1951, 1954, 1966). Accounts of color and external morphology of adults are found in Strauch (1870), Cope (1883), Storer (1925), Bishop (1943), Myers and Maslin (1948), Lowe (1950b), and Stebbins (1951, 1954, 1966). Wake (1963, 1966) described osteology and dentition. Breeding behavior and spermatophore are not recorded.

• ILLUSTRATIONS. Bishop (1943), Slevin (1928), and Pickwell (1947) contain photographs of the adult. Cochran (1961: 38) contains a photograph of what is said to be this species, but the animal pictured is clearly *Aneides lugubris.* Stebbins presents excellent drawings of the egg (1951), juvenile (1954, 1959, 1966), and adult (1951, 1954, 1959, 1966). The skull is figured by Wake (1963). Lowe (1950b) and Stebbins (1951) contain photographs of the habitat.

• DISTRIBUTION. *Aneides flavipunctatus* is essentially restricted to low and moderate elevations in the humid, forested regions of northwestern California. There are two records for extreme southwestern Oregon. *Aneides f. flavipunctatus* occurs north of San Francisco Bay from southern Sonoma and Napa counties, California, northward to southernmost Jackson County, Oregon. *Aneides f. niger* is found south of San Francisco in the hills of Santa Cruz, Santa Clara, and San Mateo counties. The species has been taken from sea level to about 1000 m, but only three of approximately 150 known localities are above 600 m. The annual rainfall in areas inhabited by the species is generally between 750 and 2000 mm.

Populations of this species utilize different kinds of microhabitats in various parts of the range. Animals in the region south of San Francisco (*A. f. niger*) and in the moist woodlands of Shasta Co. (*A. f. flavipunctatus*) usually are found at the margins of perennial streams under rocks and debris. These populations are active at the surface throughout the year. Elsewhere the species seems not to depend on the year-round availability of free surface water, although locally it may occur in seepages or along small streams. More commonly, *A. f. flavipunctatus* is encountered under rocks and logs, often



MAP. Open symbols mark known localities, solid symbol indicates type-locality of *Aneides flavipunctatus niger*; type-locality of *A. f. flavipunctatus* is too indefinite to be plotted. Shading indicates presumed total range.

in grassy areas well removed from tree cover. In the far northern part of the range rock slides are the favored microhabitat. In areas where the salamanders occur away from permanent surface water, estivation occurs during the dry season (approximately mid-April to mid-October).

The main factors that appear to limit the distribution of this salamander are moisture and temperature, equable temperatures and moderate to high rainfall being required. The species has been taken in redwood forest, Douglas fir forest, mixed evergreen forest, northern oak woodland, and coastal prairie. The species is sympatric with *A. ferreus* or *A. lugubris*, or both, over much of its range, but lacks the arboreal tendencies of these forms.

• FOSSIL RECORD. None.

• PERTINENT LITERATURE. Accounts of several kinds of habitats may be found in Wood (1939), Myers and Maslin (1948), Lowe (1950b), Stebbins (1951) and Christianson and Coambs (1970). Short notes on behavior are contained in Storer (1925), Myers and Maslin (1948), and Stebbins (1951, 1954). Lynch (Ms.) presents extensive data on distribution, morphological variation, and feeding ecology. Ray (1958) studied desiccation rates and thermal responses. Evolution of this and related species is discussed by Dunn (1926), Myers and Maslin (1948), Lowe (1950a, 1950b), Wake (1963, 1966), and Lynch (Ms.).

• ETYMOLOGY. The name "*flavipunctatus*" combines two Latin words meaning "yellow" and "spotted," referring to the iridophores (usually whitish rather than yellow) which are so conspicuous on this otherwise dark animal. The word "*niger*" is Latin for "shining black."

1. *Aneides flavipunctatus flavipunctatus* (Strauch)

Plethodon flavipunctatus Strauch, 1870:71. See species account.
Aneides flavipunctatus flavipunctatus : Myers and Maslin, 1948: 134. First use of trinomial.

• DEFINITION. In adults the dark dorsum and venter are usually spotted with white to pale yellowish iridophores and/or frosted with a suffusion of brassy iridophores. In some adults from coastal Sonoma and Mendocino counties spotting is reduced or absent. Costal grooves range from 14 to 16, but all populations examined have modes of 14 or 15. Proportional characters used by Myers and Maslin (1948) to distinguish this from the following form are not reliable (see COMMENT).

2. *Aneides flavipunctatus niger* Myers and Maslin

Aneides flavipunctatus niger Myers and Maslin, 1948:132. Type-locality, "from near the forks of Waddell Creek, Santa Cruz County, California; collected on March 17, 1929, by G. S. Myers and the late Merrill W. Brown." Holotype, Stanford Natural History Museum 2938 (now at California Academy of Sciences, examined by author).

• DEFINITION. Adults are shiny black, the whitish spots which generally characterize the nominate subspecies being absent or greatly reduced in size and abundance. Costal grooves number from 14 to 16, with 15 the modal number in all populations examined. Myers and Maslin (1948) use several body proportions to distinguish this form from *A. f. flavipunctatus*, but these diagnostic characters are based on comparison of specimens of different sizes. *A. f. niger* and *A. f. flavipunctatus* of similar size show no consistent differences in body proportions.

COMMENT

Detailed investigation of the external morphology of *A. flavipunctatus* by the present author (Ms.) reveals a complex pattern of discordant variation which does not readily lend itself to further subspecific splitting (*contra* Lowe, 1950b), and suggests that the criteria used to differentiate the two presently recognized subspecies are largely invalid.

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Primary editor for this account, James D. Anderson.

Published December 23, 1974 by the SOCIETY FOR THE STUDY OF AMPHIBIANS AND REPTILES.